

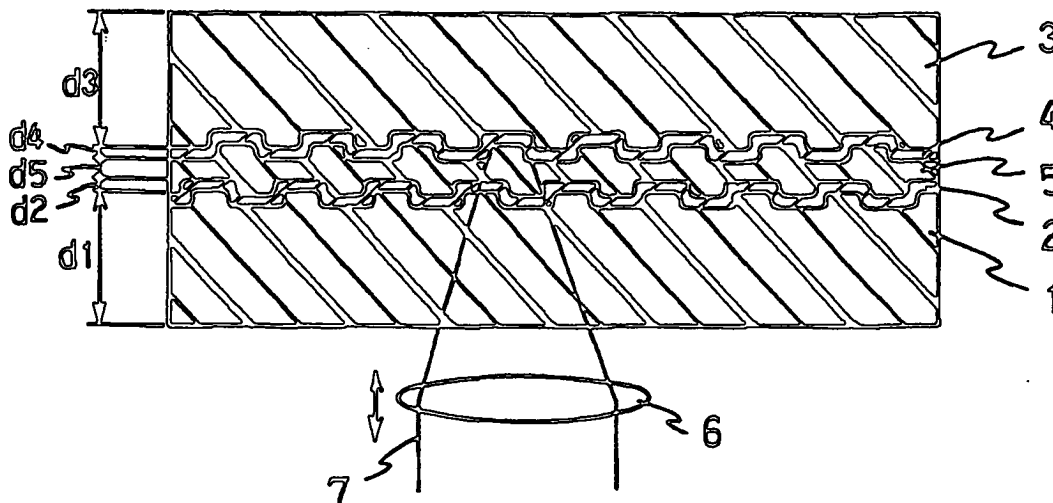
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>6</sup> : G11B 7/00, 7/007, 7/09, 7/013, 7/24, 7/26		A3	(11) International Publication Number: WO 96/31875
			(43) International Publication Date: 10 October 1996 (10.10.96)
(21) International Application Number: PCT/JP96/00973		(81) Designated States: CN, JP, KR, MX, SG, VN, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).	
(22) International Filing Date: 8 April 1996 (08.04.96)			
(30) Priority Data: 7/82248                      7 April 1995 (07.04.95)                      JP 7/214326                      23 August 1995 (23.08.95)                      JP		Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
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(72) Inventors: NISHIUCHI, Kenichi; 2-29-15-508, Okubo-cho, Moriguchi-shi, Osaka 570 (JP). NAGATA, Ken'ichi; 12-7, Kamino-cho, Nishinomiya-shi, Hyogo 663 (JP). AKAHIRA, Nobuo; 13-6, Otokoyama-kanaburi, Yawata- shi, Kyoto 614 (JP).			
(74) Agents: IKEUCHI, Hiroyuki et al.; Umeda Plaza Building, Room 401, 3-25, Nishitenma 4-chome, Kita-ku, Osaka-shi, Osaka 530 (JP).			

(54) Title: OPTICAL INFORMATION RECORDING MEDIUM, MANUFACTURING METHOD THEREFOR, MANUFACTURING APPARATUS THEREFOR, AND OPTICAL INFORMATION RECORDING AND REPRODUCING APPARATUS



## (57) Abstract

In an optical information recording medium having at least two information layers, guide grooves for tracking or sample pits or information pits corresponding to information signals are formed on a surface of a first substrate (1). A first information layer (2) formed by a thin film for reflecting a portion of a light beam (7) made incident on the first substrate (1) and permitting penetration of a portion of the light beam (7) is formed on a surface of the first substrate (1). Guide grooves for tracking or information pits corresponding to information signals are formed on a surface of a second substrate (3). A second information layer (4) having a reflectance higher than that of the first information layer (2) is formed on a surface of the second substrate (3). Between the first information layer (2) and the second information layer (4), there is formed a transparent separation layer (5) for positioning the first information layer (2) and the second information layer (4) to be spaced a predetermined distance apart from each other.

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# INTERNATIONAL SEARCH REPORT

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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 6 G11B7/00 G11B7/007 G11B7/09 G11B7/013 G11B7/24 G11B7/26		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 6 G11B		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used)		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A,4 450 553 (HOLSTER PETER L ET AL) 22 May 1984  see column 2, line 27 - line 33 see column 2, line 61 - line 65 see column 3, line 4 - line 11 see column 4, line 35 - line 44 see column 5; table 2 see column 5, line 28 - line 33 see column 7, line 49 - column 8, line 16 see column 8, line 8 - line 42 see column 10, line 31-63; figure 3	1,3-12, 17-19, 21,23-25
A	see column 8, line 17 - line 42	2,20,22, 26
A	see column 10, line 31 - line 63; figure 3	2,20,22, 26
A	see column 9, line 28 - line 35	2,20,22, 26
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<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C.		
<input checked="" type="checkbox"/> Patent family members are listed in annex.		
<b>* Special categories of cited documents :</b> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>"A"</b> document defining the general state of the art which is not considered to be of particular relevance</p> <p><b>"E"</b> earlier document but published on or after the international filing date</p> <p><b>"L"</b> document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p><b>"O"</b> document referring to an oral disclosure, use, exhibition or other means</p> <p><b>"P"</b> document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p><b>"T"</b> later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p><b>"X"</b> document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p><b>"Y"</b> document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p><b>"&amp;"</b> document member of the same patent family</p> </div> </div>		
Date of the actual completion of the international search  <div style="text-align: center; font-weight: bold;">6 September 1996</div>		Date of mailing of the international search report  <div style="text-align: center; font-weight: bold;">- 9. 10. 96</div>
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016		Authorized officer  <div style="text-align: center; font-weight: bold;">Poth, H</div>

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PCT/JP 96/00973

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 95, no. 003 & JP,A,07 073507 (TOSHIBA CORP), 17 March 1995,	1,3,4,6, 9,11,12, 17-19, 21,23-25
A	see abstract ---	2,26
Y	US,A,4 917 751 (OHTA KENJI ET AL) 17 April 1990 see column 1, line 35 - line 50 see column 2, line 38 - line 57; figure 2 ---	23,24
Y	US,A,4 990 208 (KANO NOBUHIKO) 5 February 1991 see column 1, line 32 - line 39; figure 31 see figures 5,6,9,10; examples 1,4 ---	23,24
Y	EP,A,0 443 797 (SONY CORP) 28 August 1991 see column 4, line 6 - line 30; figure 1 see column 7, line 51 - column 8, line 50; figures 9-11; examples 4-6 A	23,24
A	see column 6, line 24 - line 28; figure 4; example 1 see column 7, line 51 - column 8, line 50; figures 9-11; examples 4-6 ---	27-31
A	US,A,5 318 653 (TOIDE YUKARI ET AL) 7 June 1994 see the whole document ---	23,24, 27-31
X	US,A,5 381 401 (BEST MARGARET E ET AL) 10 January 1995 Y	32-35,37
Y	see column 3, line 59 - column 8, line 38; figures 2,4,7 Y	32, 34-36,38
Y	see column 10, line 19 - line 58; figures 7,9 ---	32,34-36
Y	EP,A,0 426 409 (MATSUSHITA ELECTRIC IND CO LTD) 8 May 1991 see column 3, line 25 - line 31; figures 3-5 ---	32,35
Y	PATENT ABSTRACTS OF JAPAN vol. 012, no. 194 (P-713), 7 June 1988 & JP,A,62 298934 (MATSUSHITA ELECTRIC IND CO LTD), 26 December 1987, see abstract ---	36
Y	PATENT ABSTRACTS OF JAPAN vol. 010, no. 060 (P-435), 11 March 1986 & JP,A,60 202545 (NIPPON DENSHIN DENWA KOSHA), 14 October 1985, see abstract ---	36

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## INTERNATIONAL SEARCH REPORT

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 PCT/JP 96/00973

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 013, no. 351 (P-912), 7 August 1989 & JP,A,01 109537 (CANON INC), 26 April 1989, see abstract ---	36
Y	US,A,5 023 439 (NODA KAZUO ET AL) 11 June 1991 see column 4, line 49 - column 5, line 10; figures 4,5 ---	38
Y	US,A,4 815 060 (NOMURA SUSUMU) 21 March 1989 see the whole document ---	38
P,Y	US,A,5 449 590 (IMAINO WAYNE I ET AL) 12 September 1995 see column 5, line 62 - column 7, line 11 see column 9; table VI ---	3,4,6
Y	EP,A,0 605 924 (PHILIPS ELECTRONICS NV) 13 July 1994 see page 9, line 49 - line 50 A see page 9, line 26 - line 35 A see page 4, line 34 - line 48 ---	12,13 14-16 3,4,6
Y	EP,A,0 446 679 (MATSUSHITA ELECTRIC IND CO LTD) 18 September 1991 see abstract ---	5,7,8,10
Y	EP,A,0 556 107 (REXROTH SIGMA) 18 August 1993 see figure 2B ---	5,7,8,10
Y	PATENT ABSTRACTS OF JAPAN vol. 013, no. 104 (P-842), 13 March 1989 & JP,A,63 282940 (SEIKO EPSON CORP), 18 November 1988, A see abstract ---	12 13
Y	US,A,3 855 426 (BOUWHUIS G) 17 December 1974 see column 3, line 28 - line 30; figure 3B ---	17
Y	US,A,4 188 433 (BROEK ARNOLDUS J M VAN DEN ET AL) 12 February 1980 see column 4, line 36 - line 40; figure ---	17
Y	EP,A,0 437 223 (MATSUSHITA ELECTRIC IND CO LTD) 17 July 1991 see column 6, line 55 - column 7, line 1 see column 7, line 22 - line 31 ---	10,11
	--- -/--	

# INTERNATIONAL SEARCH REPORT

Int. l. Application No  
PCT/JP 96/00973

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A,5 126 996 (IIDA TETSUYA ET AL) 30 June 1992	12,13
A	see column 3, line 56 - line 68; figures 1,2 -----	14-16

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP 96/00973

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see continuation sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/SAJ210

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|----------------------|--|
| 1. claims 1,2,19-22: | stable medium;   |
| 2. claims 23-26:     | manufacturing of a medium with an<br>adhesive resin layer;             |
| 3. claims 27-31:     | efficient production apparatus;  |
| 4. claims 32-38:     | recording/reproduction apparatus;                                      |
| 5. claims 3,4,6:     | appropriate reflectances and<br>absorptions of the information layers; |
| 6. claims 5,7,8:     | appropriate layer structures for the<br>information layers;            |
| 7. claims 9,12-18:   | information reliefs;   |
| 8. claims 10,11:     | reproducing-recording medium   |



# INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. onal Application No

PCT/JP 96/00973

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4450553	22-05-84	NL-A- 7803069	25-09-79
		AT-B- 363701	25-08-81
		AU-B- 525972	09-12-82
		AU-B- 4534779	27-09-79
		CA-A- 1149060	28-06-83
		CH-A- 643387	30-05-84
		DE-A- 2910390	04-10-79
		FR-A- 2420811	19-10-79
		GB-A,B 2017379	03-10-79
		JP-C- 1363333	09-02-87
		JP-A- 54130902	11-10-79
		JP-B- 61027815	27-06-86
		SE-A- 7902406	23-09-79
US-A-4917751	17-04-90	JP-C- 1764349	28-05-93
		JP-B- 4053017	25-08-92
		JP-A- 60239952	28-11-85
		JP-C- 1764350	28-05-93
		JP-B- 4053018	25-08-92
		JP-A- 60239953	28-11-85
US-A-4990208	05-02-91	FR-A- 2606198	06-05-88
		NL-A- 8702493	16-05-88
		JP-A- 63239628	05-10-88
EP-A-0443797	28-08-91	JP-A- 3245329	31-10-91
		AT-T- 129354	15-11-95
		AU-B- 637866	10-06-93
		AU-B- 7116191	29-08-91
		CA-A- 2036715	23-08-91
		DE-D- 69113833	23-11-95
		DE-T- 69113833	04-04-96
		US-A- 5378517	03-01-95
		US-A- 5284538	08-02-94
US-A-5318653	07-06-94	JP-A- 3046138	27-02-91
		JP-A- 3058334	13-03-91
		DE-D- 69020027	20-07-95
		DE-T- 69020027	09-11-95
		EP-A- 0390413	03-10-90

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. l. Application No

PCT/JP 96/00973

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-5318653		EP-A- 0624870	17-11-94
		KR-B- 9402346	23-03-94
		US-A- 5540967	30-07-96
		JP-B- 2508336	19-06-96
		JP-A- 3254438	13-11-91
-----			
US-A-5381401	10-01-95	US-A- 5255262	19-10-93
		US-A- 5410530	25-04-95
		US-A- 5513170	30-04-96
		US-A- 5449590	12-09-95
		CA-A- 2066004	05-12-92
		CN-A,B 1067521	30-12-92
		CN-A- 1090081	27-07-94
		CN-A- 1114770	10-01-96
		CN-A- 1120717	17-04-96
		CN-A- 1120718	17-04-96
		EP-A- 0517490	09-12-92
		JP-A- 5151644	18-06-93
		US-A- 5446723	29-08-95
-----			
EP-A-0426409	08-05-91	CA-A- 2028544	01-05-91
		JP-B- 2503300	05-06-96
		JP-A- 3219440	26-09-91
		US-A- 5428597	27-06-95
		US-A- 5303225	12-04-94
-----			
US-A-5023439	11-06-91	JP-C- 1842815	12-05-94
		JP-A- 63257925	25-10-88
		US-A- 5107102	21-04-92
-----			
US-A-4815060	21-03-89	DE-A- 3733422	05-05-88
		GB-A,B 2196115	20-04-88
-----			
US-A-5449590	12-09-95	US-A- 5381401	10-01-95
		US-A- 5255262	19-10-93
		CA-A- 2134140	16-06-95
		CN-A- 1112272	22-11-95
		EP-A- 0658887	21-06-95
		JP-A- 7201077	04-08-95
		US-A- 5410530	25-04-95

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. l. Application No

PCT/JP 96/00973

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-5449590		US-A- 5513170	30-04-96
		CA-A- 2066004	05-12-92
		CN-A,B 1067521	30-12-92
		CN-A- 1090081	27-07-94
		CN-A- 1114770	10-01-96
		CN-A- 1120717	17-04-96
		CN-A- 1120718	17-04-96
		EP-A- 0517490	09-12-92
		JP-A- 5151644	18-06-93
		US-A- 5446723	29-08-95
-----			
EP-A-0605924	13-07-94	CN-A- 1090668	10-08-94
		JP-A- 6267110	22-09-94
		US-A- 5511057	23-04-96
-----			
EP-A-0446679	18-09-91	CA-A- 2036853	15-09-91
		JP-A- 4212735	04-08-92
		KR-B- 9503182	01-04-95
		US-A- 5130971	14-07-92
		US-A- 5233599	03-08-93
		US-A- 5289453	22-02-94
-----			
EP-A-0556107	18-08-93	FR-A- 2687193	13-08-93
		JP-A- 6281028	07-10-94
		US-A- 5279331	18-01-94
-----			
US-A-3855426	17-12-74	NL-A- 7103233	13-09-72
		BE-A- 780451	11-09-72
		CA-A- 953419	20-08-74
		CH-A- 558053	15-01-75
		CH-A- 558052	15-01-75
		DE-A- 2209761	21-09-72
		FR-A- 2129626	27-10-72
		GB-A- 1387304	12-03-75
		SE-B- 396493	19-09-77
		US-A- 3999009	21-12-76
-----			
US-A-4188433	12-02-80	NL-A- 7713710	14-06-79
		AU-B- 4235778	21-06-79
		DE-A- 2853262	13-06-79

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 96/00973

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4188433		FR-A- 2411462	06-07-79
		GB-A- 2009996	20-06-79
		JP-A- 54089704	17-07-79
		SE-A- 7812634	13-06-79
-----			
EP-A-0437223	17-07-91	JP-B- 2514261	10-07-96
		JP-A- 3209642	12-09-91
		DE-D- 69118409	09-05-96
		DE-T- 69118409	14-08-96
		US-A- 5134604	28-07-92
-----			
US-A-5126996	30-06-92	JP-A- 2223030	05-09-90
		JP-B- 8023941	06-03-96
		DE-D- 68922185	18-05-95
		DE-T- 68922185	09-11-95
		EP-A- 0368442	16-05-90
		US-A- 5171392	15-12-92
-----			